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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/702,667	11/01/2000	Mariana Munteanu	50103-337	9652

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McDERMOTT, WILL & EMERY
600 13th Street NW
Washington, DC 20005-3096

EXAMINER
BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
1773	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

MK2

Office Action Summary	Application No.	Applicant(s)	
	09/702,667	MUNTEANU ET AL.	
	Examiner	Art Unit	
	Kevin M Bernatz	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 5-9* is/are rejected.

7)☒ Claim(s) *3 and 4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Upon reconsideration and in view of the deficiencies noted by the Board of Patent Appeals in the remand of September 24, 2004, the finality of the rejection of March 5, 2003 is withdrawn and prosecution reopened. An office action on the merits follows.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Examiner's Comments

3. The Examiner notes that the "corresponding structure" and "equivalent structure" of the means + function language in claim 7 was defined in the correspondence mailed May 6, 2004.

4. The Examiner notes that the language "an underlayer on *a* non-magnetic substrate" in claim 1 should be "on *the* non-magnetic substrate" since there is only one non-magnetic substrate present.

Claim Objections

5. Claims 3 and 4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (IEEE Trans. Mag. 32(5), 1996, 3590 - 3592) in view of Shiroishi et al. (U.S. Patent No. 5,147,732).

Regarding claim 1, Zhang et al. disclose a magnetic recording medium comprising a non-magnetic substrate (*Experimental – "Al substrate"*), an underlayer on the non-magnetic substrate (*Experimental – "Cr underlayer"*), a first magnetic layer on the underlayer (*Table 1*) and a second magnetic layer on the first magnetic layer (*Table 1*), wherein the first magnetic layer exhibits a higher SMNR than the second magnetic layer (*Experimental section*).

Zhang et al. fail to disclose the relative Ms values of the magnetic layers.

However, Shiroishi et al. teach that in dual layered recording media, the upper magnetic layer (i.e. applicants' "second magnetic layer") should possess a Ms higher than the lower magnetic layer (i.e. applicants' "first magnetic layer') inorder to insure good reproducing output (i.e. resolution) (*Figure10; col. 5, lines 34 – 38 and col. 9, lines 4 – 67*).

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Zhang et al. to possess a second magnetic layer exhibiting a higher Ms than the first magnetic layer as taught by Shiroishi et al. inorder to insure good reproducing output.

Regarding claim 7, since Zhang et al. in view of Shiroishi et al. teach the corresponding structure of the means + function language as described above, the Examiner deems that the disclosed invention is deemed to meet the claimed corresponding "function" of "achieving a high SMNR, narrow half-amplitude pulse width, high resolution and high magnetic saturation".

Regarding claim 8, both Zhang et al. and Shiroishi et al. are directed to dual-layered media wherein the second magnetic layer is directly on the first magnetic layer (*Zhang et al., Experimental section*).

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. in view of Shiroishi et al. as applied to claim 1 above, and further in view of Yamashita et al. (U.S. Patent No. 5,180,640).

Zhang et al. and Shiroishi et al. are relied upon as described above.

While both Zhang et al. and Shiroishi et al. teach CoCrPt alloys for the magnetic layers, neither of the above teach controlling the Cr or Co concentrations meeting applicants' claimed limitations.

However, Yamashita et al. teach that the saturation magnetization of a Co-alloy is directly proportional to the amount of Co (*Figure 2 and col. 6, lines 51 – 62*) and given

that Shiroishi et al. teach a second magnetic layer possessing a higher saturation magnetization than the first magnetic layer, one of ordinary skill in the art would have readily recognized that such an optimization of the Ms values could be achieved by insuring that the Co concentration of the second magnetic layer was higher than the cobalt concentration of the first magnetic layer.

It would, therefore, have been obvious to one of ordinary skill in the art at the time of applicants' invention to modify the device of Zhang et al. in view of Shiroishi et al. such that the cobalt concentration in the second magnetic layer is higher than in the first magnetic layer as taught by Yamashita et al. since this would lead to a second magnetic layer exhibiting a higher Ms than the first magnetic layer, which leads to good reproducing output.

Furthermore, Yamashita et al. teach that increasing the Cr content of a CoCr alloy results in improved SMNR (*col. 1, lines 8 – 24 and col. 2, line 3 bridging col. 3, line 33*) and given that Okuyama et al. desires a first magnetic layer possessing improved SMNR versus the second magnetic layer, one of ordinary skill in the art would have readily recognized that such an optimization of SMNR values could be achieved by insuring that the Cr concentration of the first magnetic layer was higher than the chromium concentration of the second magnetic layer.

It would, therefore, have been obvious to one of ordinary skill in the art at the time of applicants' invention to modify the device of Zhang et al. in view of Shiroishi et al. such that the chromium concentration in the first magnetic layer is higher than in the second magnetic layer as taught by Yamashita et al. since this would lead to a first

magnetic layer exhibiting a higher SMNR than the second magnetic layer, which leads to a low noise and high output recording medium (*Okuyama et al., col. 2, lines 39 – 49*).

9. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. in view of Shiroishi et al. as applied above to claims 1, 7 and 8, and further in view of Malhotra et al. (U.S. Patent No. 6,303,217 B1).

Zhang et al. and Shiroishi et al. are relied upon as described above.

Regarding claims 5 and 6, neither of the above disclose using a dual layered underlayer meeting applicants' claimed composition limitations.

However, Malhotra et al. teach using dual layered underlayers, both being formed of Cr alloys, including embodiments comprising different Cr alloys, wherein the use of such a dual layered underlayer produces a recording medium possessing improved signal amplitude (*col. 1, line 50 bridging col. 2, line 22 and examples*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Zhang et al. in view of Shiroishi et al. to use a dual layered underlayer meeting applicants' claimed composition limitations as taught by Malhotra et al. since the use of such a dual layered underlayer produces a recording medium possessing improved signal amplitude.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1, 2 and 7 – 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Okuyama et al. (U.S. Patent No. 6,129,981).

Regarding claims 1, 7 and 8, Okuyama et al. disclose a magnetic recording medium comprising a non-magnetic substrate (*Figure 3, element 1*), an underlayer on the non-magnetic substrate (*element 3*); a first magnetic layer on the underlayer (*element 4B*), and a second magnetic layer directly (claim 8) on the first magnetic layer (*element 4A*), wherein the first magnetic layer (*CoCrPtTaNb – col. 12, lines 49 – 65*) exhibits a higher SMNR than the second magnetic layer (*col. 8, lines 13 – 21 and col. 14, lines 47 – 54*); and the second magnetic layer (*CoCrPtWC – col. 12, lines 49 – 65*) exhibits a higher Ms than the first magnetic layer (*Table 1: 440 emu/cc versus 380 emu/cc*). Regarding claim 7, since Okuyama et al. teach the corresponding structure of the means + function language as described above, the Examiner deems that the disclosed invention is deemed to meet the claimed corresponding "function" of "achieving a high SMNR, narrow half-amplitude pulse width, high resolution and high magnetic saturation".

Regarding claim 2, Okuyama et al. disclose both layers possessing Co, Cr and Pt, as well as preferred embodiments encompassing applicants' claimed relative Cr and Co contents (*col. 8, lines 13 – 21: first magnetic layer of 74 at% Co and 17 at% Cr combined with a second magnetic layer with 50 – 84 at% Co and 14 – 23 at% Cr*). Given that Okuyama et al. disclose using a higher resolution and higher Ms alloy as the second ferromagnetic layer (*col. 8, lines 13 – 21 and Table 1*), the Examiner deems that there is sufficient guidance in the disclosed reference to control the disclosed layer properties while using Co and Cr compositions meeting applicants' claimed relative magnitudes.

Regarding claim 9, Okuyama et al. disclose forming both magnetic layers at 11 nm (e.g. 110 Å) (*col. 13, lines 13 – 16*). The Examiner deems that 11 nm (110 Å) reads on the second magnetic layer thickness of "about 100 Å" (i.e. "about 10 nm"), since 11 nm is deemed sufficient to read on "about 10 nm".

Additional Claim Rejections Under 35 USC § 103

12. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuyama et al. as applied above to claims 1, 2 and 7 - 9, and further in view of Malhotra et al. ('217 B1).

Okuyama et al. is relied upon as described above.

Regarding claims 5 and 6, Okuyama et al. fail to disclose using a dual layered underlayer meeting applicants' claimed composition limitations.

However, Malhotra et al. teach using dual layered underlayers, both being formed of Cr alloys, including embodiments comprising different Cr alloys, wherein the use of such a dual layered underlayer produces a recording medium possessing improved signal amplitude (*col. 1, line 50 bridging col. 2, line 22 and examples*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Okuyama et al. to use a dual layered underlayer meeting applicants' claimed composition limitations as taught by Malhotra et al. since the use of such a dual layered underlayer produces a recording medium possessing improved signal amplitude.

13. Claims 1 and 7 - 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuyama et al. as applied above to claims 1, 2 and 7 – 9, and further in view of Shiroishi et al. ('732).

Okuyama et al. is relied upon are disclosed above.

Regarding claims 1, 7 and 8, while Okuyama et al. teach embodiments reading on the claimed limitations as described above, Okuyama et al. fail to *explicitly* teach controlling the Ms of the second magnetic layer to be higher than the first magnetic layer. The Examiner notes that Okuyama et al. teach that the second magnetic layer should exhibit "excellent resolution" (*col. 8, lines 13 – 21*).

However, Shiroishi et al. teach that in dual layered recording media, the upper magnetic layer (i.e. applicants' "second magnetic layer") should possess a Ms higher than the lower magnetic layer (i.e. applicants' "first magnetic layer') inorder to insure

good reproducing output (i.e. resolution) (*Figure10; col. 5, lines 34 – 38 and col. 9, lines 4 – 67*).

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Okuyama et al. to possess a second magnetic layer exhibiting a higher Ms than the first magnetic layer as taught by Shiroishi et al. inorder to insure good reproducing output.

Regarding claim 9, Okuyama et al. disclose forming both magnetic layers at 11 nm (e.g. 110 Å) (*col. 13, lines 13 – 16*). The Examiner deems that 11 nm (110 Å) reads on the second magnetic layer thickness of "about 100 Å" (i.e. "about 10 nm"), since 11 nm is deemed sufficient to read on "about 10 nm".

14. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuyama et al. in view of Shiroishi et al. as applied above to claims 1 and 7 – 9, and further in view of Yamashita et al. ('640).

Okuyama et al. and Shiroishi et al. are relied upon as disclosed above.

While Okuyama et al. teach preferred embodiments overlapping applicants' claimed relative Co and Cr concentrations, Okuyama et al. fail to *explicitly* teach controlling the Co concentration of the second magnetic layer to be higher than the first magnetic layer while also controlling the Cr concentration of the first magnetic layer to be higher than the second magnetic layer.

However, Yamashita et al. teach that the saturation magnetization of a Co-alloy is directly proportional to the amount of Co (*Figure 2 and col. 6, lines 51 – 62*) and given

that Shiroishi et al. teach a second magnetic layer possessing a higher saturation magnetization than the first magnetic layer, one of ordinary skill in the art would have readily recognized that such an optimization of the Ms values could be achieved by insuring that the Co concentration of the second magnetic layer was higher than the cobalt concentration of the first magnetic layer.

It would, therefore, have been obvious to one of ordinary skill in the art at the time of applicants' invention to modify the device of Okuyama et al. in view of Shiroishi et al. such that the cobalt concentration in the second magnetic layer is higher than in the first magnetic layer as taught by Yamashita et al. since this would lead to a second magnetic layer exhibiting a higher Ms than the first magnetic layer, which leads to good reproducing output.

Furthermore, Yamashita et al. teach that increasing the Cr content of a CoCr alloy results in improved SMNR (*col. 1, lines 8 – 24 and col. 2, line 3 bridging col. 3, line 33*) and given that Okuyama et al. desires a first magnetic layer possessing improved SMNR versus the second magnetic layer, one of ordinary skill in the art would have readily recognized that such an optimization of SMNR values could be achieved by insuring that the Cr concentration of the first magnetic layer was higher than the chromium concentration of the second magnetic layer.

It would, therefore, have been obvious to one of ordinary skill in the art at the time of applicants' invention to modify the device of Okuyama et al. in view of Shiroishi et al. such that the chromium concentration in the first magnetic layer is higher than in the second magnetic layer as taught by Yamashita et al. since this would lead to a first

magnetic layer exhibiting a higher SMNR than the second magnetic layer, which leads to a low noise and high output recording medium (*Okuyama et al., col. 2, lines 39 – 49*).

15. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuyama et al. in view of Shiroishi et al. as applied above to claims 1 and 7 - 9, and further in view of Malhotra et al. ('217 B1).

Okuyama et al. and Shiroishi et al. are relied upon as described above.

Regarding claims 5 and 6, neither of the above disclose using a dual layered underlayer meeting applicants' claimed composition limitations.

However, Malhotra et al. teach using dual layered underlayers, both being formed of Cr alloys, including embodiments comprising different Cr alloys, wherein the use of such a dual layered underlayer produces a recording medium possessing improved signal amplitude (*col. 1, line 50 bridging col. 2, line 22 and examples*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Okuyama et al. in view of Shiroishi et al. to use a dual layered underlayer meeting applicants' claimed composition limitations as taught by Malhotra et al. since the use of such a dual layered underlayer produces a recording medium possessing improved signal amplitude.

Response to Arguments

16. The prior rejections of claims 1, 7 and 8 under 35 U.S.C § 102(b) – Ohkijima et al. as evidenced by applicants' admissions,

claims 1 and 5 – 7 under 35 U.S.C § 103(a) – Moroishi et al. in view of Miyazaki et al. and Zhang et al.,

claim 2 under 35 U.S.C § 103(a) – Moroishi et al. in view of Miyazaki et al., Zhang et al., Yoshikawa et al., applicants' admissions and Song et al., and

claim 6 under 35 U.S.C § 103(a) – Moroishi et al. in view of Miyazaki et al., Zhang et al., and Ross et al. have been withdrawn in view of the decision by the Board of Patent Appeals and Interferences.

In so far as applicants arguments apply to the present rejections of record, as noted by the Board of Patent Appeals and Interferences (BPAI) (*page 8 of response*) the combination of Zhang et al. with a similar prior art structure disclosed by Shiroishi et al. (i.e. dual-layered CoCr-alloy media with no intermediate layer therebetween) renders the combination of controlling the lower of two magnetic layers to possess a higher SMNR while simultaneously controlling the upper of two magnetic layers to possess a higher saturation magnetization (Ms) value. In the process of updating the search per the BPAI instructions, the Examiner noted the reference to Okuyama et al. which appears to anticipate the claimed invention represented by claims 1, 2 and 7 – 9.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art reference to Zhang et al. (U.S. Patent No. 5,952,097) provides explicit teaching that the lower layer of a dual-magnetic-layer medium should possess the superior SMNR performance, though does not mention the relative Ms values.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin M. Bernatz, PhD.
Primary Examiner

November 9, 2004

DEBORAH JONES
SUPERVISORY PATENT EXAMINER